

Connecticut Coastal Zone Management Program

FLOOD VULNERABILITY ASSESSMENT
CITY OF MILFORD, CT

CZIC COLLECTION

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1983

CITY OF MILFORD, CONNECTICUT
FLOOD VULNERABILITY ASSESSMENT

Connecticut Department of Environmental Protection
Natural Resources Center
Hartford, Connecticut

HD 1676-6 08/1983

CITY OF MILFORD, CONNECTICUT
FLOOD VULNERABILITY ASSESSMENT

Prepared by:

Department of Environmental Protection
Natural Resources Center
Hartford, Connecticut
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PROGRAM DESCRIPTION

The Natural Resources Center in conjunction with the Water Resources and Coastal Area Management Units of the Department of Environmental Protection undertook a study utilizing a grant from the Federal Emergency Management Agency (FEMA) to assess potential flood hazards in Connecticut's coastal communities.

The study produced an inventory of residential, commercial and industrial structures located within coastal and riverine flood zones and examined municipal flood preparedness measures. Specific program goals included: (1) development of a sound data base for examining flood hazard potential, (2) informing municipal leadership of potential flood problems, (3) assisting the municipalities in developing better flood forecasting, warning and evacuation procedures, (4) encouraging the municipalities to prepare special contingency plans for flood events, (5) proposing that municipalities adopt strict flood damage ordinances in high hazard areas, (6) informing individual property owners of potential flood hazards and assisting them with flood mitigation techniques and (7) carrying out a marketing campaign for the purchase of flood insurance.

The study was conducted in each of Connecticut's 25 coastal communities, listed in Table 1. An inventory of flood-prone structures was developed by transferring Federal Emergency Management Agency's Flood Insurance Rate Maps and Flood Hazard Boundary Maps to mylar overlays of the 1980 aerial photographs (1:1,000). Structures and utilities located within the A (100-year flood), B (500-year flood), V (coastal flood) and F (riverine floodway) zones were counted and grouped. The results of the inventory are shown in Table 2.

A detailed municipal assistance program for flood hazard mitigation was then initiated in the coastal towns. The detailed program developed a municipal profile documenting the community's history of flooding, existing flood studies, structural flood control projects, demographic and geographic information. An assessment of local zoning regulations and land-use practices was made to determine their compatibility with natural floodplain functions. In addition, an examination of the community's participation in the National Flood Insurance Program was made. The number of flood insurance policies in effect was compared with the inventory of flood-prone structures to determine additional flood insurance needs, and claims data was reviewed to delineate areas having repeated flooding problems. Finally, local flood forecasting, warning and response procedures were reviewed to assess their adequacy in addressing flood hazards.

The municipal assistance program additionally provided flood hazard mitigation assistance to owners of residential property located in coastal high hazard flood zones. A questionnaire was distributed to a representative sample of homeowners to assess the level of flood hazard awareness on the Connecticut shoreline and to provide information on flood preparedness planning, the National Flood Insurance Program and residential flood-proofing techniques.

TABLE 1: CONNECTICUT TOWNS INCLUDED IN THE COASTAL FLOOD HAZARD
VULNERABILITY STUDY, STATE ASSISTANCE PROGRAM

Branford
Bridgeport
Clinton
Darien
East Haven
East Lyme
Fairfield
Greenwich
Groton
Guilford
Madison
Milford
New Haven
New London
North Haven
Norwalk
Old Lyme
Old Saybrook
Stamford
Stonington
Stratford
Waterford
Westbrook
West Haven
Westport

TAB 2

NATURAL RESOURCES CENTER

Municipal Flood Hazard Inventory
Preliminary Structure Counts

October 1982

A (100-Yr. Flood Zone)		B (500-Yr. Flood Zone)		V (Coastal Flood Zone)		F (Riverine Floodway)		TOTAL	
1. Fairfield	2,477	West Haven	983	Milford	623	Bridgeport	101	Fairfield	3,136
2. Stratford	2,004	Old Saybrook	858	Branford	391	East Haven	82	Stratford	2,754
3. Stonington	1,385	New Haven	757	East Haven	353	Norwalk	74	Milford	2,281
4. Milford	1,248	Old Lyme	728	Madison	275	Stratford	63	West Haven ²	2,230
5. Bridgeport	1,191	Madison	661	Westport ¹	275	Stamford	30	Old Saybrook	1,991
6. Groton	1,069	East Haven	594	West Haven ²	246	West Haven	30	East Haven	1,845
7. Norwalk	1,065	Fairfield	549	Stratford	245	Fairfield	10	Bridgeport ⁴	1,825
8. West Haven	971	Westbrook	538	Old Saybrook	235	Westport	10	Stonington	1,822
9. Old Saybrook	898	Branford	529	Greenwich	208	North Haven	7	New Haven	1,628
10. East Haven	816	Bridgeport	506	Guilford	174	Darien	6	Groton	1,568
11. New Haven	816	Groton	476	Norwalk	147	Greenwich	5	Norwalk	1,493
12. Greenwich	810	Stratford	442	Old Lyme	132	New Haven	4	Old Lyme	1,468
13. Clinton	683	Stonington	422	Darien	126	Guilford	3	Branford	1,429
14. Old Lyme	607	Milford	410	Westbrook	126	Madison	3	Greenwich	1,272
15. Westport	537	Clinton	408	Fairfield	100	Clinton	2	Clinton	1,188
16. Branford	509	New London	336	Clinton	95	East Lyme	2	Madison	1,102
17. Westbrook	419	East Lyme	298	New Haven	51	Groton	1	Westbrook	1,083
18. Stamford	335	Darien	265	New London	48	Old Lyme	1	Westport	1,046
19. Guilford	321	Greenwich	249	Bridgeport	27	Branford	0	Guilford	727
20. Waterford	226	Waterford	248	Groton	22	Milford	0	Stamford	607
21. East Lyme	224	Stamford	232	Stonington	15	New London	0	Darien	540
22. Madison	163	Guilford	229	Waterford	12	Old Saybrook	0	East Lyme	529
23. Darien	143	Westport	224	Stamford	10	Stonington	0	Waterford	486
24. North Haven	111	Norwalk	207	East Lyme	5	Waterford	0	New London	455
25. New London	71	North Haven	56	North Haven	0	Westbrook	0	North Haven	174
	19,099		11,205		3,941		434		34,679

1 Count does not include all islands.

2 Figures may be altered by reconstruction of sea wall.

3 Floodway maps not available.

4 Figures include Town of Stonington and Borough of Stonington.

5 Figures include Town of Groton, City of Groton, Groton Long Point Association and Noank Fire District.

6 Figures may be altered upon completion of revised wave-height studies.

CJR
10/25/82

MUNICIPAL PROFILE

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

Municipal Flood Hazard Inventory

Profile for: Milford, CT

Mailing Address: City Hall
River Street
Milford, CT

Date: July 1983

1. Town Officials:

- a. Chief Elected Official: Alberta C. Jagoe
- b. Chief Executive Officer: Alberta C. Jagoe
- c. Public Works Director (Acting): Jake Donnelly
- d. Town Planner: Wade Pierce
- e. Building Inspector: William Slater
- f. Civil Preparedness Officer: William Healey
(Chief, Fire Department)
- g. Chairman, Flood and Erosion Control Board: Edmund Colangelo

2. Form of Government: Mayor, Board of Aldermen

3. Regional Planning Agency: South Central Connecticut
96 Grove Street
New Haven, CT 06510

4. Total Municipal Land Area: 23.5 square miles

5. Population:

- a. Permanent: 50,898 (1980 Census)
- b. Seasonal: 500 - 1000 maximum
- c. Number located in flood hazard zones:
 - 2,863 in V zone
 - 500 in Wepawaug River Flood Zone
 - 3,363

6. General History of Flooding (Where and When):

Major flooding events include August 17-20, 1955 (50-year), October 14-17, 1955 (25-year), September 18-21, 1938 and June 4-7, 1982.

Flooding on the Housatonic River upstream from the Conrail bridge has been caused by high tides and high river flows acting either separately or coincidentally. High Housatonic River flows historically have resulted from either heavy rainfall alone or a combination of rainfall and snowmelt throughout the Housatonic River basin.

Flooding in other Milford streams is also caused by high flows and high tides acting either separately or together. The principal damage resulting from high river flows is the destruction and loss of man-made development in floodplain and wetland areas adjacent to streams.

Extremely high tide levels induced by ocean storm surges and wind-driven waves accompanying hurricanes and coastal storms are the principal causes of coastline flooding. The principal damage in the tidal zone is the destruction and loss of man-made development in the low coastal areas and tidal estuaries adjacent to Long Island Sound.

The flooding of June 4-7, 1982 caused severe flooding along the Wepawaug River. City Hall was flooded, causing extensive damage to offices and city records located in the basement. Commercial establishments located on the easterly side of River and Daniel Streets, just downstream from City Hall, sustained flood damages. Severe flooding damages were sustained at the Boston Post Road bridge over the Wepawaug River, extending northward approximately one half mile. Lastly, approximately sixty structures, residential and commercial, between the Connecticut Turnpike and Bridge Street were inundated by flooding.

7. Flood Studies:

<u>Date</u>	<u>Author/Sponsoring Agency</u>	<u>Description</u>
In Progress	USDA/Soil Conservation Service	Central Coastal Cooperative River Basin Study
In Progress	U.S. Army Corps of Engineers, New England Division	Section 205 Reconnaissance Study, Wepawaug River
In Progress	Diversified Technologies	Great Creek Study
In Progress	Department of Environmental Protection	Milford shoreline

On-going	Department of Transportation	DOT Study 83-149 Quirk Pond, Woodmont Road
February 1982	R.M.Field Associates, Inc./DEP Coastal Area Management Program	Connecticut Coastal Flood Hazard Area Study
March 1978	U.S.Army Corps of En- gineers, New England Division/U.S.Dept of Housing & Urban Devel- opment, Federal Insurance Administration	Flood Insurance Study
July 1976	U.S. Army Corps of En- gineers, New England Division/DEP Coastal Area Management Program	Connecticut Coastline Study - Effects of Coastal Storms

8. Existing Flood Control Structures:

<u>Type</u>	<u>No.</u>	<u>Location</u>	<u>Description</u>
Breakwater	1	Off Milford Point	
Seawall	1	Morningside	

9. Flood Control Projects, Proposed or in Progress:

<u>Description</u>	<u>Target Date of Completion</u>
1,680-ft. revetment - Burwells and Fairview beaches	In progress

10. Flood Warning System:

- a. Description: Sirens stationed throughout the city and local radio stations
- b. Operated and Maintained by: Fire Department Fire Alarm Division

11. Status of Emergency Operations Plan:

- a. Title: "Milford Plan For Civil Preparedness, Civil Defense or Disaster Emergencies",
- b. Date of latest revision: April 26, 1980
- c. Specific flood annexes: Natural Disaster Plan

12. Inventory of Structures Located in Flood Hazard Zones (Summary):

	<u>Residential</u>	<u>Commercial/Industrial</u>	<u>TOTAL</u>
A Zone:	1,203	45	1,248
B Zone:	403	7	410
V Zone:	615	8	623
Floodway:*	0	0	0
TOTAL:	<u>2,221</u>	<u>60</u>	<u>2,281</u>

*No floodway maps available

b. Municipal and other public ownership in flood hazard zones:

State of Connecticut: Silver Sands State Reserve (293 acres)
State of Connecticut: Wheeler Wildlife Area
State of Connecticut: Charles Island
City of Milford: City Beach (adjacent to Silver Sands)

13. National Flood Insurance Program Status:

- a. Date entered emergency program:
- b. Date entered regular program: September 29, 1978

14. Flood Insurance Policy Information: Month Ending
March 31, 1982

NUMBER OF POLICIES (3/31/82)

<u>Dwelling</u>	<u>New</u> <u>Other</u>	<u>Dwelling</u>	<u>Renewal</u> <u>Other</u>	<u>TOTAL POLICIES</u>
121	12	749	106	988

AMOUNT OF INSURANCE (in whole dollars)

<u>Dwelling</u>	<u>Other</u>	<u>TOTAL</u>	<u>WRITTEN PREMIUM</u>
\$36,672,300	\$9,621,500	\$46,293,800	\$140,220.54

POLICY CLAIMS PAYMENTS (12/31/82)

<u>Year</u>	<u>YEAR OF PAYMENT Payments</u>	<u>Amount Paid</u>	<u>YEAR OF FLOOD Payments</u>	<u>Amount Paid</u>
1977	0	\$ 0.00	5	\$ 8,140.40
1978	39	\$ 52,457.14	37	\$ 45,913.29
1979	31	\$102,146.21	31	\$117,269.21
1980	43	\$166,324.29	143	\$745,312.11
1981	103	\$595,707.37	0	\$ 0.00
1982	66	\$432,232.60	66	\$432,232.60

15. Drainage Basins in which Municipality Located:

<u>Basin Number</u>	<u>Basin Name</u>
5000	South Central Shoreline
5306	Indian River
5307	Wepawaug River
6000	Housatonic River

16. Watercourses:

<u>Name</u>	<u>Basin Number</u>
Calf Pen Meadow Creek	5000
Oyster River	5000
Indian River	5306
Wepawaug River	5307
Stubby Plain Brook	5307

Beaver Brook	6000
Great Creek	6000
Housatonic River	6000
Turkey Hill Brook	6000

17. Lakes and Reservoirs (Impoundments):

<u>Name</u>	<u>Watercourse</u>	<u>Basin Number</u>
Quirks Pond	Oyster River tributary	5000
Clark Pond	Indian River	5306
Indian Lake	Indian River	5306
Rose Mill Pond	Indian River	5306
Nigs Pond		5307
Lily Pond	Beaver Brook tributary	6000
Milford Reservoir	Beaver Brook	6000

18. Wetlands:

- a. Location Basin Number # of Acres (if available)
- b. Wetlands Regulatory Authority: State of Connecticut

19. Coastline:

- a. Number of Miles: 19.3
- b. Percent of developed coastline (beachfront housing): 73%

20. Coastal and Riverine Structures:

a. Dams

<u>NRC Dam #</u>	<u>Dam or Impoundment Name</u>	<u>Watercourse</u>	<u>Ownership</u>
084-01	Clark Pond	Indian River	N/A
084-02	West Pond	Housatonic River tributary	N/A
084-03	Milford Reservoir	Beaver Brook	Utility
084-04	City Pond	Wepawaug River	Municipal
084-05	Rose Mill Pond	Indian River	Private
084-06	Quirks Pond	Calf Pen Meadow Brook	N/A
084-07	Indian Lake	Indian River	Private
084-08	Mondo Pond	Beaver Brook tributary	Utility
084-09	Wepawaug Pond	Wepawaug River	N/A
084-10	Beaver Pond	Beaver Brook	Municipal
084-11	Unnamed	Wepawaug River	Municipal
084-12	Turkey Pond	Turkey Hill Brook	N/A
084-13	New Pond	Housatonic River tributary	N/A
084-14	Herbert Pond	Housatonic River tributary	N/A
084-15	Unnamed	Wepawaug River	Private

b. Bridges:

<u>Road Name</u>	<u>Watercourse</u>	<u>Responsibility</u>
Route 1	Housatonic River	State
Route 1	Beaver Brook	State
Route 1	Wepawaug River	State
Route 15	Housatonic River	State
Route 95	Wepawaug River	State
Route 95	Indian River	State
Route 162	Wepawaug River	State

Route 162	Indian River	State
Route 162	Turtle Creek	State
Route 736	Calf Pen Meadow Creek	State
Route 736	Gulf Pond	State
Route 747	Beaver Brook	State
Flax Mill Lane	Wepawaug River	Municipal
Gulf Street	Gulf Pond	Municipal
Maple Street	Wepawaug River	Municipal
River Street	Wepawaug River	Municipal
Walnut Street	Wepawaug River	Municipal
West Main Street	Wepawaug River	Municipal
Bridge Street	Wepawaug River	Municipal

c. Jetties and Groins:

<u>Number</u>	<u>Location</u>
2	Cedar Beach
5	Wildemere, Walnut & Myrtle Beaches
12	Gulf Beach
4	Bayview Beach
8	Pond Point Beach
20	Point Beach
18	Fairview/Burwells Beach
2	Milford Harbor
3	Welches Point

d. Piers and Docks:

<u>Number</u>	<u>Location</u>
13	Housatonic River
3	Housatonic River
6	Milford Harbor

21. Ports/Marinas:

<u>a. Name</u>	<u>Address</u>
Commodore Marina, Inc.	164 Rogers Avenue
Flagship Marina, Inc.	40 Bridgeport Avenue
Milford Harbor Marina & Boat Works, Inc.	1 High Street
Milford Yacht Club	
Sea Frolic Yacht Club	
Spencer's Marina, Inc.	44 Rose Street

Town Dock & Landing Ramp

Valley Yacht Club

Wepawaug Yacht Club

The Chandlery

1 High Street

- b. Name and Address of Harbor Master: Allen G. Berrien
Milford Boat Works
1 High Street
Milford, CT

22. Utilities:

- a. Names of Utility Companies Serving the Town:
United Illuminating Co.
Southern New England Telephone Co.
New Haven Gas Co.

- b. Facilities Located in Flood Zones (Solid Waste Disposal,
Water Treatment, Sewage Treatment, Power Generation):

<u>Type</u>	<u>Flood Zone</u>	<u>Floodproofed?</u> If so, to what extent?
Sewage Treatment Plant (Beaver Brook)	100 year	No, but fairly well elevated
*Sewage Treatment Plant (Great Creek)	100 year	
*Sewage Treatment Plant (Milford Harbor)	100 year	
*Sewage Treatment Plant (Indian River)	100 year	

*To be put out of operation in 2 or 3 years upon
completion of new Sewage Treatment Plant on
Housatonic River

23. Water Supply:

- a. Name and Address of Water Utility Serving the Town:
South Central Connecticut Regional Water Authority

b. Public Water Supply Reservoirs:

<u>Name</u>	<u>Watercourse</u>
Milford Reservoir, a.k.a. Beaver Brook Reservoir (Emergency Reservoir)	Beaver Brook

c. Public Water Supply Wells:

<u>Name</u>	<u>Location</u>	<u>Comments</u>
NONE		

d. Estimated # of private wells: 300-500 maximum (north of Boston Post Road)

e. Potential effects of flooding on water supply:

24. Storm Water Drainage System:

a. Written Plan: ___yes ___X no

25. Floodplain Zoning and Floodplain Ordinances

I. Mapping

- () Flood plains shown on zoning
- (X) Flood plains not shown on zoning map
- (X) Flood insurance rate maps used (Referenced in zoning text)
- (X) Flood hazard boundary maps used (Referenced in zoning text)
- () Other _____

II. Zoning Text (Z) and Ordinance Text (O)

A. Floodway

- (Z) Prohibited uses: encroachments which would increase flood levels during base flood discharge
- (Z) Permitted uses: all; subject to standards and provisions for flood hazard reduction specified in zoning text
- (Z) Special Exceptions: mobile homes in an existing mobile home park or existing mobile home subdivision

B. Floodway Fringe

1. Base flood elevations and flood hazard factors not determined (All A Zones)

(Z) Prohibited uses: any uses which would adversely affect the capacity of drainage facilities, increase flood damages to other lands, or accelerate erosion; storage of injurious materials; open or outdoor storage of any material or equipment

(Z) Permitted uses: all; subject to standards and provisions for flood hazard reduction specified in zoning text

() Special Exceptions: _____

2. Base flood elevations and flood hazard factors determined (A1-A30, V1-V30 Zones)

(Z) Prohibited uses: none

(Z) Permitted uses: all; residential structures must meet lowest floor elevation requirement and be certified; non-residential may either meet lowest floor elevation requirement or be floodproofed so that walls below the base flood level are substantially impermeable; be constructed to resist hydrostatic loads and effects of buoyancy; and be certified

(Z) Special Exceptions: mobile homes subject to additional regulation

C. Coastal Areas

(Z) Prohibited uses: alteration of sand dunes which would increase potential flood damage

(Z) Permitted uses: all; must be elevated, located landward of the reach of the mean high tide, and certified

(Z) Special Exceptions: mobile homes in an existing mobile home park or an existing mobile home subdivision

III. Procedural Provisions

A. Permit Requirements

(X) Yes () No Provides a separate permitting procedure

- for all new construction and substantial alteration in flood zones
- ☐ Yes ☒ No Provides for uses "as of right"
- ☒ Yes ☐ No Specifies permit application procedures
- ☒ Yes ☐ No Provides standards for permit approval
- ☐ Other: _____

B. Variance Requirements

- ☒ Yes ☐ No Provides a separate permitting procedure for variances in flood zones
- ☒ Yes ☐ No Specifies conditions for application submittal
- ☒ Yes ☐ No Specifies standards for permit approval
- ☐ Other

C. Certificate of Zoning Compliance

- ☒ Required ☐ Not Required

D. Ordinance Amendment Procedures

- ☒ Specified ☐ Not Specified

E. Appeal Procedures

- ☒ Specified ☐ Not Specified

IV. Miscellaneous

A. Enforcement Provision - Penalties for nonconformance

- ☒ Yes ☐ No Daily fines for noncompliance

B. Interpretive Provisions

- ☒ Yes ☐ No Severability clause
- ☒ Yes ☐ No Liability disclaimer
- ☒ Yes ☐ No Purpose and findings of fact
- ☒ Yes ☐ No Definitions

C. Regulated Areas

- ☒ 100-year (1%) flood (All A Zones)
- ☐ 100-year flood for most uses, but 500-year (.2%) flood for critical actions
- ☒ Coastal Areas
- ☐ Other

V. Comments/Recommendations

Flood Plain District is a class of district in addition to and overlapping one or more of the other districts.

Milford's floodplain zoning regulations are excellent guidelines for the city's future floodplain management. By detailing mandatory floodproofing measures, construction specifications in flood zones, and standards for granting permits or variances, the regulations facilitate administrative and court review and provide certainty and predictability in the review process.

The only recommendation made concerns critical uses in flood zones. While judicious use of the 100 year flood standard as a minimum for flood hazard area regulation should be continued, critical facilities should be protected to the 500 year flood elevation. Critical facilities include disaster, fire and police centers, hospitals, prisons, facilities for the elderly and handicapped, fuel and hazardous or toxic materials storage. These facilities pose unique, serious threats to public health and safety when exposed to flooding, and the town may wish to consider banning such uses from the floodway and flood fringe and coastal high hazard flood areas.

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COASTAL PROPERTY HOMEOWNER'S QUESTIONNAIRE:

TABULATION AND ANALYSIS

COASTAL PROPERTY HOMEOWNER'S QUESTIONNAIRE

Location of Property _____ (Town)

Circle Best Answer

FLOOD HAZARD AWARENESS

- | | |
|---|------------|
| 1. Do you a) own
b) rent
c) manage
d) other | 1. a b c d |
| 2. Is this your permanent address?
If 'no', what percent of your time is spent here?
In what community is your permanent address? | 2. yes no |
| 3. Are you aware that your home/cottage is located within a coastal high hazard flood zone? | 3. yes no |
| 4. Do you feel that the risk of injury and/or property damage to which you are exposed is an acceptable price to pay for living on the Connecticut coastline? | 4. yes no |
| 5. Have you experienced flooding at your present location?
If 'yes', in what year?
Describe the damage.
Provide a dollar estimate of the damage. | 5. yes no |

FLOOD PREPAREDNESS

- | | |
|--|-------------|
| 6. Are you aware that your homeowner's insurance does not cover losses related to flooding? | 6. yes no |
| 7. Your community is participating in the National Flood Insurance Program, which is a federal program created to reduce annual flood losses through better planning and to provide property owners with the opportunity to purchase flood insurance guaranteed by the federal government. Are you:

a) insured to replacement value of the building and contents?
b) insured to less than full replacement value?
c) not insured? | 7. a b c |
| 8. If your home was severely damaged or destroyed by a flood, could you afford to rebuild according to the more stringent building codes applicable to new construction in flood zones?

a) could afford to rebuild at same location.
b) could afford to rebuild outside of flood zone.
c) could not afford to rebuild. | 8. a b c |
| 9. Have you determined your lowest flood elevation in relation to the probability and extent that your home is likely to be flooded? | 9. yes no |
| 10. Have you learned alternate evacuation routes from your home and/or place of business to high, safe ground? | 10. yes no |
| 11. In the event of a flood, do you know where you can obtain medical help and where emergency shelter is located? | 11. yes no |
| 12. Are you aware of your community's flood preparedness plans? | 12. yes no |
| 13. In the event of a major flood, who would you expect to pay for disaster response and recovery costs?

a) federal government
b) state government
c) municipal government
d) yourself | 13. a b c d |

CONTINUED ON BACK

PUBLIC AWARENESS

The Coastal Property Homeowner's Questionnaire section of the Municipal Assistance Program was designed to meet two needs: 1) assess the degree of flood hazard awareness and preparedness of Connecticut's coastline residents, and 2) provide information on floodplain management, flood preparedness planning, residential floodproofing techniques, emergency operations, cleanup and repair, and the National Flood Insurance Program.

I. Flood Hazard Awareness and Preparedness Assessment

Data Accumulation

Utilizing FEMA's Flood Insurance Rate Maps for the City of Milford, a list of roads that occur partially or totally within the A (100-year) and V (Coastal) flood zones was compiled. Milford's tax assessment records were then used to collect the names and addresses of one hundred randomly selected individuals for the questionnaire mailing distribution list. (A list of streets to which the questionnaire was distributed is shown in Table 3). Included with the questionnaire was a cover letter which explained the Municipal Assistance Program and the purpose of the questionnaire, and a self-addressed, stamped envelope to encourage questionnaire returns. (A copy of the questionnaire and cover letter is included in this section).

Data Processing

Each returned questionnaire was given its respective town code and individual identification number. The information each contained was encoded and transferred to a key-punch computer card. The entire

deck was then run through a comprehensive Statistical Analysis System (SAS) program. The program is capable of computing individual frequency statistics as well as cross-comparison statistics; the results of which are displayed in tabular and histogram chart form.

Statistical Analysis--City of Milford

The questionnaire statistical analysis consisted of correlating variables (individual questions) to compare the level of public flood hazard awareness with the application of flood preparedness practices. The subsequent results assisted in the determination of problem areas that we recommend be addressed in order to help alleviate any unnecessary future expenditures in the form of life, property loss, and disaster relief aid.

The Natural Resources Center received thirty questionnaires from Milford. (A summary of responses is shown in Table 4). Due to the fact that the sample size is small in relation to the city's 1980 flood zone residential structure inventory (2,221), the statistical results must be regarded with discretion. The results generally indicated the following:

--Seventy percent of the individuals who responded to the questionnaire had experienced flooding in the past at their present location.

--Even though all (one hundred percent) of the respondents are aware of their existence within a high hazard flood zone, eighty-three percent feel that the risks imposed are an acceptable price to pay for living along the Connecticut shoreline.

--Ninety-seven percent of the respondents are aware that their homeowner's insurance does not cover losses related to flooding but

only forty-seven percent are insured to full replacement value of their building and contents.

--A significant number of individuals (seventeen percent) are unaware of alternate evacuation routes from their home and/or place of business to high, safe ground in the event of a flood.

--Ten percent of the respondents do not know where to obtain medical help or where emergency shelter is located.

--Approximately one half of the respondents (forty-seven percent) are unaware of any community flood preparedness plans.

--Although eighty-eight percent of the respondents are prepared to take precautionary measures in the event of a flood, only a small number (thirty percent) have implemented the more secure floodproofing measures to protect their property from potential flooding.

II. Information Provisions

Questionnaire Mail Package

Contained in the questionnaire mail package that was sent to the one hundred flood zone inhabitants were three pamphlets published by FEMA. One pamphlet provided suggestions to help minimize the loss of life and property in the event of a flood while the other two provided information on the National Flood Insurance Program. As of March 31, 1982, Milford had 988 flood insurance policies in effect. Based on the 1980 flood zone residential inventory of 2,221 structures, there is a forty-four percent coverage. One of the goals of the Municipal Assistance Program is to carry out a marketing campaign for the purchase of flood insurance. Due to the fact that the federal government has placed a greater responsibility upon the state and local governments to pay for disaster response and recovery costs in

the event of a major flood and the fact that individual and family grant assistance has been reduced, we believe it would be beneficial for all parties if there were an increase in the number of policyholders in the City of Milford.

Additional Information Option

Included on the back of each questionnaire was an option that gave interested individuals the opportunity to request more detailed information on flood preparedness, floodproofing, emergency actions, and cleanup and repair. The booklet and booklet excerpts sent to each respondent were written by several state and federal agencies which are involved with the administration of proper floodplain management practices.

Flood Information Exhibit

In order to broaden our scope of coverage to those individuals who live within a flood zone but did not receive a questionnaire or the opportunity to request additional information, the Natural Resources Center designed a flood mitigation information exhibit. The exhibit includes all of the material that is provided through the questionnaire plus three pamphlets and two booklets which cover additional subjects such as hurricane safety tips, coastal home construction considerations, and floodproofing regulations. This exhibit is best suited for display in a public building (public library, town hall) and is available to all of the municipalities that are included in the Municipal Assistance Program.

III. Conclusion

An analysis of the cross-comparison statistics indicated that the individuals who showed deficiency in overall flood awareness and

preparedness were those who had not experienced flooding in the past. In addition, the level of public interest regarding flood preparedness is high in Milford, as we received many requests for additional information. Therefore, the development of an effective public information campaign in the City of Milford would not only help to satisfy the present high interest regarding flood hazard mitigation but would also serve to increase the level of flood awareness and preparedness of the individuals who are presently unaware that they live in this potentially hazardous area.

TABLE 3

QUESTIONNAIRE DISTRIBUTION (by street)

City of Milford

1. Ann Street
2. Bittersweet Avenue
3. Blair Street
4. Bridgewater Avenue
5. Caroline Street
6. Chetwood Street
7. Cooper Avenue
8. Derby Avenue
9. Marsh Street
10. Melba Street
11. Point Beach Drive
12. Sand Street
13. Seaview Avenue
14. Virginia Street
15. Waterbury Avenue

TABLE 4

SUMMARY OF RESPONSES: COASTAL PROPERTY HOMEOWNERS' QUESTIONNAIRE

CITY OF MILFORD

30 Questionnaires Returned/100 Mailed Out = 30% Response Rate

I. Flood Hazard Awareness

Q.1 <u>Flood Zone Property Status</u>		Choice	Frequency	Percent
Do you	a) own	a	30	100.0
	b) rent	b	0	0.0
	c) manage	c	0	0.0
	d) other	d	0	0.0
	*) no response	*	0	0.0

Q.2 Permanent Address

Is this your permanent address?	yes	27	90.0
	no	3	10.0
	*	0	0.0

Q.3 High Hazard Flood Zone Awareness

Are you aware that your home/ cottage is located within a high hazard flood zone?	yes	30	100.0
	no	0	0.0
	*	0	0.0

Q.4 Risk of Injury, Property Acceptable

Do you feel that the risk of injury and/or property damage to which you are exposed is an acceptable price to pay for living on the Connecti- cut coastline?	yes	25	83.3
	no	5	16.7
	*	0	0.0

Q.5 Experienced Flooding

Have you experienced flooding at your present location?	yes	21	70.0
	no	9	30.0
	*	0	0.0

II. Flood Preparedness

Q.6 Homeowner's Insurance Limitations

Are you aware that your homeowner's insurance does not cover losses related to flooding?	yes	29	96.7
	no	1	3.3
	*	0	0.0

Q.7 Building and Contents Insurance
Status

Your community is participating in the National Flood Insurance Program, which is a federal program created to reduce annual flood losses through better planning and to provide property owners with the opportunity to purchase flood insurance guaranteed by the federal government. Are you

a) insured to replacement value of the building and contents?	a	14	46.7
b) insured to less than full replacement value?	b	13	43.3
c) not insured?	c	2	6.7
*) no response	*	1	3.3

Q.8 Afford to Rebuild

If your home was severely damaged or destroyed by a flood, could you afford to rebuild according to the more stringent building codes applicable to new construction in flood zones?

a) could afford to rebuild at same location	a	16	53.3
b) could afford to rebuild outside of flood zone	b	1	3.3
c) could not afford to rebuild	c	8	26.7
d) no response	*	5	16.7

Q.9 Determine Lowest Flood Elevation

Have you determined your lowest flood elevation in relation to the probability and extent that your home is likely to be flooded?	yes	19	63.3
	no	8	26.7
	*	3	10.0

Q10. Learn Alternate Evacuation Routes

Have you learned alternate evacuation routes from your home and/or place of business to high, safe ground?	yes	21	70.0
	no	5	16.7
	*	4	13.3

Q.11 Know Where to Obtain Help
and Shelter

In the event of a flood, do you know where you can obtain medical help and where emergency shelter is located?	yes	27	90.0
	no	3	10.0
	*	0	0.0

Q.12 Aware of Town Preparedness

Are you aware of your community's flood preparedness plans?	yes	14	46.7
	no	14	46.7
	*	2	6.6

Q13 Who Should Pay

In the event of a major flood, who would you expect to pay for disaster response and recovery costs?

a) federal government	a	14	46.7
b) state government	ab	3	10.0
c) municipal government	abc	1	3.3
d) yourself	abcd	2	6.7
*) no response	ad	2	6.7
	b	3	10.0
	bd	1	3.3
	c	2	6.7
	d	1	3.3
	*	1	3.3

Q14A-14G

Recent changes in federal legislation have placed greater responsibility on the homeowner to take first actions to reduce damage before and immediately following a flood. Are you prepared to take the following precautionary measures in the event of a flood?

Q.14A <u>Turn Off Utilities</u>	yes	28	93.3
	no	2	6.7
	*	0	0.0

Q.14B <u>Close Gas, Water Valves</u>	yes	25	83.3
	no	5	16.7
	*	0	0.0

Q.14C Move Valuable Possessions

Moving valuable possessions (furniture, small appliances, jewelry, artwork, coins, etc.) to upper floors or removing them from the building	yes	26	86.7
	no	3	10.0
	*	1	3.3

Q.14D <u>Secure or Bring Possessions Inside</u>	yes	29	96.7
	no	1	3.3
	*	0	0.0

Q.14E Fill Bathtubs, Sinks With Clean Water

Filling bathtubs and sinks with clean water in case regular supplies are contaminated	yes	29	96.7
	no	1	3.3
	*	0	0.0

Q.14F	<u>Board-Up Windows</u>	yes	23	76.7
		no	6	20.0
		*	1	3.3

Q.14G Open Basement Windows - Lower Pressure

Leaving basement windows and doors	yes	24	80.0
open to prevent pressure build-up	no	4	13.3
	*	2	6.7

Q15A-15E

Have you implemented one or more of the following flood-proofing measures to protect your property from potential flooding?

Q.15A Relocate or Elevate Basement Utilities

Relocating or elevating basement util-	yes	16	53.3
ities (furnace, hot water heater, el-	no	6	20.0
ectrical panel, water and gas meters)	will		
above flood elevations	consider	1	3.3
	*	7	53.3

Q.15B Raise House Above Flood Elevation

Raising the entire house above flood	yes	5	16.7
elevation on a new or extended	no	21	70.0
foundation	will		
	consider	3	10.0
	*	1	3.3

Q.15C Rearrange or Protect Damageable Property

Rearranging or protecting damageable	yes	19	63.3
property within an existing structure	no	8	26.7
	will		
	consider	2	6.7
	*	1	3.3

Q.15D Install Temporary or Permanent Closures

yes	9	30.0
no	13	43.3
will		
consider	3	10.0
*	5	16.7

Q.15E Construct Small Walls or Dikes

yes	12	40.0
no	14	46.7
will		
consider	1	3.3
*	3	10.0



STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION



June 1982

Dear Connecticut Resident:

Your residence on the Connecticut coastline enables you to fully appreciate and enjoy the vast resources of Long Island Sound and the coastal area. While the Sound provides a medium for recreational activities, it is also the source of a serious threat to shoreline occupants: coastal storm flooding. Whether the shore is the site of your permanent residence or a second home, it is imperative that you become aware of potential flood hazards to ensure your family's safety. The enclosed questionnaire and brochures provide important information on measures you can take to protect your home and property from future flooding. Please take time now to read and complete the questionnaire.

Connecticut has not experienced a major, statewide flood in a number of years; yet, it is extremely vulnerable to flood hazards. An inventory was recently conducted to determine the number of residential, commercial and industrial structures occurring within riverine and coastal flood zones in 20 coastal towns. Although 30,000 structures were found to be located within flood zones, only 8,000 flood insurance policies are presently in effect. Seventy-three percent of the structures located within flood zones are not insured against flooding. In the absence of a major coastal storm, flood insurance claims for those same 20 towns still approached \$6 million between the years 1977-1981. Furthermore, recent changes in legislation will shift a larger percentage of flood disaster recovery costs from the federal to state and local governments. Clearly, preventive measures must be taken now to reduce the effects of a potential disaster.

The most effective flood preparedness actions rest on the efforts made by the individual property owners of the coastal flood zones. While it is not possible to completely eliminate the danger of flooding to homes in coastal and low-lying areas, it is possible to reduce the cost of flood damage to your property through flood preparedness planning. The enclosed questionnaire was developed by the Natural Resources Center as part of its Flood Plain Management Municipal Assistance Program. Distributed to a representative sample of coastline residents, the questionnaire seeks to assess residents' flood hazard awareness and provide information on flood preparedness planning, the National Flood Insurance Program, and residential flood-proofing techniques. Please complete and return the questionnaire in the enclosed envelope; your efforts will play an important role in improving the state's flood plain management program. Any questions regarding the questionnaire or the state's role in flood plain management should be directed to the Natural Resources Center at 566-3540.

Sincerely yours,

Cynthia J. Rummel
Project Leader
Natural Resources Center

CJR:cz

Enclosures

Phone:

165 Capitol Avenue • Hartford, Connecticut 06106

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EMERGENCY OPERATIONS PLAN REVIEW

EMERGENCY OPERATIONS PLAN REVIEW

Approximately 35,000 structures along Connecticut's shoreline have been identified as flood prone; 2,300 of these are located in the City of Milford. Connecticut has not experienced a major coastal storm in a number of years; yet the damage potential associated with a coastal storm in any Connecticut municipality is phenomenal, involving property destruction, loss of life and business interruption. The municipalities of Connecticut must therefore develop and maintain a level of flood preparedness that is adequate to protect its citizens in the event of a major coastal flooding event.

A preliminary review of the Emergency Operations Plans in effect in Connecticut's coastline towns revealed a marked deficiency in preparedness measures specifically addressing flood hazards. A detailed analysis was therefore conducted to identify deficiencies and assess the overall adequacy of the municipal Emergency Operations Plans. Milford's Emergency Operations Plan (Milford Plan for Civil Preparedness, Civil Defense or Disaster Emergencies, February 28, 1977, updated April 26, 1980) was evaluated using the National Weather Service's Planning Guidance and Checklist for Evaluation of Existing Flood Preparedness Plans. The following section assesses the adequacy of the existing provisions of Milford's Emergency Operations Plans and identifies plan items that are recommended but not presently included. General comments regarding Milford's Emergency Operations Plans are included in the Recommendations section which follows.

**CHECKLIST FOR EVALUATION OF
EXISTING FLOOD PREPAREDNESS PLANS**

Plan Item	Presently Included	Existing Adequacy	Subtasks To Be Planned
WARNING ELEMENT			
Flood Recognition Task			
A1. Select warning point	Yes	Very Good	
A2. Warning point operational procedures	Yes	Good	d, e, f
A3. Observer/monitor procedures	No	Poor	a, b
Warning Dissemination Task			
A4. Procedures for issuing warnings	Yes	Fair	b, c, d
A5. Procedures for warning special recipients	No	Poor	a, b, c
A6. Procedures for warning dissemination	Yes	Fair	b, c, e
EVACUATION AND RESCUE ELEMENT			
Evacuation Area Identification Task			
B1. Identify overflow areas	No	Poor	a, b
B2. Identify ponding areas	No	Poor	
B3. Identify other hazardous areas	No	Poor	a, b, c
Evacuation Procedures Development Task			
B4. Select evacuation destinations	Yes	Fair	b, c
B5. Identify evacuation routes	No	Poor	a, b, c
B6. Establish evacuation priorities	No	Poor	a, b, c
B7. Establish evacuation procedures	Yes	Very Good	

Reception Center Operations Task

B8. Determine reception center requirements	Yes	Fair	a,b,c
B9. Select reception centers	Yes	Good	
B10. Reception center operational procedures	Yes	Good	d

Emergency Action Task

B11. Identify need for emergency action	Yes	Good	
B12. Determine emergency action requirements	Yes	Good	d
B13. Establish emergency action procedures	Yes	Good	

DAMAGE REDUCTION ELEMENT

Flood Fighting Task

C1. Identify needed flood fighting actions	No	Poor	a,b,c,d,e,f
C2. Establish flood fighting procedures	No	Poor	a,b,c,d
C3. Establish property protection procedures	Yes	Fair	a,c

Utility Management Task

C4. Procedures for curtailment	Yes	Fair	a,c
C5. Emergency operation procedures	No	Poor	a,b,c

Traffic Control Task

C6. Identify traffic control needs	Yes	Good	b,c
C7. Establish traffic control procedures	Yes	Good	e

Maintenance of Vital Services Task

C8. Identify vital services/ facilities	Yes	Fair	a,b,d
C9. Vital services operational procedures	Yes	Fair	a,c
C10. Establish records protection procedures	No	Poor	a,b,c,d,e,f

RECOVERY ELEMENT

Maintenance of Public Health Task

D1. Morgue procedures	Yes	Fair	b,c
D2. Preventive health care procedures	Yes	Very Good	

Return of Services Task

D3. Procedures to restore utility services	Yes	Fair	a,d
D4. Procedures to restore traffic	Yes	Fair	c

Rehabilitation and Repair Task

D5. Procedures for cleanup	Yes	Fair	b,d
D6. Procedures for damaged buildings	Yes	Good	

Mobilization of Assistance Task

D7. Identify recovery assistance	Yes	Good	d
D8. Establish procedures for obtaining assistance	Yes	Fair	b,c

PUBLIC INFORMATION ELEMENT

Community Education Task

E1. Prepare public information program	Yes	Fair	a,c,d,e,f g,h
E2. Prepare technical assistance program	No	Poor	a,b,c,d

Emergency Information Task

E3. Identify emergency information requirements	Yes	Good	
E4. Establish emergency procedures	Yes	Fair	a,b,c
E5. Prepare warning announcements	No	Poor	a,b,c

PLAN IMPLEMENTATION ELEMENT

Resources Identification Task

F1. Identify required resources	Yes	Good	
F2. Identify available resources	Yes	Good	

Responsibility Allocation Task

F3. Determine needs for responsibility assignments	Yes	Good	
F4. Assign responsibilities	Yes	Good	

Coordination Task

F5. Establish inter-agency coordination procedures	Yes	Good	
F6. Establish emergency acquisition arrangements	Yes	Fair	a,b
F7. Establish state-local arrangements	Yes	Fair	b,c
F8. Establish site-specific planning guidelines	No	Poor	a,b,c

PLAN MAINTENANCE ELEMENT

Plan Updating Task

G1. Periodic updating procedures	Yes	Poor	a,b,c,d,e,f, g,h,i
G2. Event-dependent updating procedures	No	Poor	a,b,c

Plan Improvement Task

G3. Describe needed plan extensions	No	Poor	a,b
G4. Describe needed plan refinements	No	Poor	a,b,c,d
G5. Establish procedures for critiques	No	Poor	a,b

Plan Practice Task

G6. Establish plan test procedures	Yes	Poor	a,c,d,e,f
G7. Establish plan simulation	No	Poor	a,b,c,d,e,f

1. Planning Guidance

** = subtasks NOT presently included in
Emergency Operations Plan NOT DONE

A. Warning Element

Planning Objectives: To define systems for early recognition of floods and dissemination of warnings which are accurate, timely and reliable.

Planning Tasks: Flood Recognition
Warning Dissemination

Flood Recognition Task

A1. Select a suitable local warning point which:

- a. is operational and staffed on a 24-hour basis;
- b. has adequate communications capability to receive flood information by primary and back-up means from all relevant sources;
- c. is safely located with respect to flooding or other common hazards; and
- d. has an auxiliary power supply and other provisions necessary to maintain full capability under adverse conditions.

A2. Establish operational procedures at the warning point which are applicable to the flood recognition approach used and:

- a. specify arrangement for prompt receipt of flood watches and flood warnings from NWS;
- b. describe handling procedures for incoming information;
- c. specify conditions under which data collection networks will be activated and the means of activation;
- ** d. specify arrangements for initiating observation of rivers and rainfall and for relaying of observations;
- ** e. identify the point(s) to be referenced by NWS in flood warnings and describe the translation necessary to interpret stage and time information for use in the specific area covered by the preparedness plan; and/or
- ** f. describe detailed procedures for preparing forecasts or estimates of flood severity based on river and rainfall observer reports.

A3. Establish operational procedures to be followed by river and rainfall observers which:

- ** a. identify the informational content and frequency of reports to be made;
- ** b. provide for both primary and back-up means of communications.

Warning Dissemination Task

A4. Establish procedures for issuing warnings which:

- a. assure prompt attention to information concerning flood threats;
- ** b. specify what types of warnings are to be issued under various possible conditions;
- ** c. assure warnings are commensurate with the expected severity of the flood; and
- ** d. assure warnings are coordinated with NWS.

A5. Establish procedures for disseminating information concerning potential flood threats to special warning recipients which

- ** a. identify which special warning recipients are to be notified under various possible conditions of flood threat;
- ** b. describe the means of communications to be used in alerting each special warning recipient; and
- ** c. specify record keeping, acknowledgement and other processes to assure notices are given and received.

A6. Establish procedures for the dissemination of warnings to the general public which:

- a. are adequate to assure all affected persons receive warnings on a timely basis, notwithstanding telephone and power failures;
- ** b. provide for various levels of warning appropriate to the immediacy and seriousness of the flood threat;
- ** c. specify the conditions under which each means of warning dissemination will be used;
- d. describe the process by which parties responsible for each means of dissemination are instructed to begin distributing warnings; and
- ** e. take into consideration the time of day, day of the week or seasonal factors affecting the need for or means of warning dissemination.

B. Evacuation and Rescue Element

Planning Objectives: To prevent the loss of life due to flooding or to flood related causes.

Planning Tasks: Evacuation Area Identification
Evacuation Procedures Development
Reception Center Operations
Emergency Actions

Evacuation Area Identification Task

B1. Identify areas which will be inundated at each potential level of flooding due to:

- ** a. overbank flows; and
- ** b. entry of flood waters through sewers, drainage channels or other means of access.

B2. Identify areas which will be inundated due to internal drainage or ponding unrelated to flood height.

B3. Identify areas requiring evacuation for reasons other than inundation including:

- ** a. loss of access or escape routes;
- ** b. loss or curtailment of utility or other emergency services; and
- ** c. site-specific problems.

Evacuation Procedures Development Task

B4. Select evacuation destinations for each area to be evacuated which are:

- a. safe from flooding and other related hazards;
- ** b. easily identified to the public;
- ** c. within time and distance commensurate with the warning time; and
- d. suitable for use for the expected duration of the flood.

B5. Identify best available evacuation routes which are:

- ** a. safe from early flooding due to urban drainage or other impediments;
- ** b. passable in all weather; and
- ** c. adequate to handle expected traffic.

B6. Establish priorities for evacuation which take into account:

- ** a. time of flooding with respect to other areas;
- ** b. severity of flooding; and
- ** c. loss of escape routes.

B7. Establish procedures for carrying out evacuation which are consistent with the warning time available including:

- a. insuring affected public is advised of the need to evacuate, safe destinations, routes and time available;
- b. providing general assistance in transportation and in preparing homes and businesses for evacuation;
- c. providing special assistance to those having unusual evacuation needs;
- d. assuring evacuation is complete;
- e. establishing traffic controls to prevent accidental entry into dangerous areas, identify evacuation routes and facilitate evacuation traffic; and
- f. establishing surveillance over the evacuation area to insure safety of the area.

Reception Center Operations Task

B8. Estimate the duration, damage and population affected in the case of a severe flood and determine reception center requirements including:

- ** a. number of persons likely to be housed overnight;
- ** b. number of meals to be served;
- ** c. type and extent of medical or other care required;
- d. required services, equipment and supplies for operation;
- e. required personnel for operation.

B9. Select reception center(s) which:

- a. are safe under conditions of severe flooding;
- b. have or can be provided with necessary equipment and services;
- c. provide sufficient space for required activities;
- d. are available on short notice for the required duration;
- e. are readily identifiable to the public and accessible from all areas.

B10. Establish procedures for the operation of reception centers including:

- a. basis on which reception center operations will be activated and terminated;
- b. source and means of providing necessary supplies, equipment and services;
- c. allocation of space for reception center functions; and
- ** d. provision of temporary assistance and information on long term recovery aid.

Emergency Action Task

B11. Evaluate the areas subject to flooding or isolation with respect to the types of emergency activities which may be required including:

- a. emergency evacuation of persons from dangerous areas;
- b. emergency provision of medical attention, fire control or other assistance;
- c. emergency operation or curtailment of power, water, gas and other services;
- d. control or containment of toxics, explosive gases and other dangerous commodities; and
- e. search for survivors.

B12. Determine requirements for conducting emergency actions including:

- a. personnel;
- b. transportation;
- c. heavy duty equipment such as boats, trucks, earth movers and others; and
- ** d. portable hand tools and other equipment.

B13. Establish procedures for carrying out emergency actions including:

- a. organization of rescue squads;
- b. placement of personnel and equipment for conducting emergency activities;
- c. coordination arrangements for identifying needs for assistance and responding to calls; and
- d. maintenance of communications.

C. Damage Reduction Element

Planning Objectives: To reduce public and private property damages from flooding or flood related causes.

Planning Tasks: Flood Fighting
Utility Management
Traffic Control
Maintenance of Vital Services

Flood Fighting Task

- C1. Identify needed flood fighting actions to reduce overflow, seepage and other types of flooding as well as erosion due to flood waters including:
- ** a. assuring flood gates or sewer outlets are closed;
 - ** b. temporary heightening of levees or floodwalls;
 - ** c. closing of openings in levees and other embankments;
 - ** d. containing overflows through manholes and other openings in the sewer system;
 - ** e. pumping of internal drainage waters; and
 - ** f. control of erosion at bridges, levees, building foundations and roadway embankments.
- C2. Establish flood fighting procedures to control overflow, seepage or other types of flooding with respect to:
- ** a. locations where each action is to be carried out;
 - ** b. maintaining surveillance to determine the need for personnel, equipment and further actions;
 - ** c. priority for accomplishment; and
 - ** d. extent of action required for various flood heights.
- C3. Establish procedures for the evacuation or temporary removal and relocation of automobiles, furniture, valuables, clothes, business and personal records, machinery and other movable property to reduce damage including:
- ** a. identification of types of action required at various locations and expected flood heights;
 - b. arrangements for the provision of labor and transportation assistance; and
 - ** c. identification of safe locations for storage of property.

Utility Management Task

C4. Establish procedures for the curtailment of utility services to flooded areas including:

- ** a. need for curtailment by area or individual property for each flood height;
- b. means for accomplishing curtailment (i.e., homeowner, utility staff); and
- ** c. preparations to be made by property owner (within allowable time) prior to evacuation to minimize damage and facilitate the eventual return of services.

C5. Establish utility operation procedures to be used immediately prior to and during floods to:

- ** a. minimize losses and risks caused by damaged utility systems;
- ** b. reduce damage done to utility equipment, supplies and operational capabilities; and
- ** c. maintain necessary utility services to vital community facilities.

Traffic Control Task

C6. Identify needs for traffic control prior to, during and immediately after floods including:

- a. preventing accidental travel in areas which are or will be flooded;
- ** b. establishing evacuation routes and speeding evacuation traffic;
- ** c. facilitating access to evacuation areas for transportation, rescue and other essential traffic;
- d. preventing use of damaged roadways and bridges; and
- e. controlling access to damaged areas.

C7. Establish procedures for traffic control which:

- a. identify areas to be controlled at each expected flood height;
- b. specify locations where traffic control is to be established;
- c. identify detours or types of control to be effected;
- d. specify placement of personnel, barricades and signs to effect necessary control and means of enforcement; and

- ** e. describe the process for implementing pass systems or other arrangements for limiting post-flood entry to damaged areas to residents and other authorized persons.

Maintenance of Vital Services Task

C8. Identify police, fire, medical and other vital community services and facilities with respect to:

- ** a. location;
- ** b. vulnerability to interference by inundation, loss of access or communications;
- c. interdependencies on other services and facilities including utilities;
- ** d. temporary floodproofing or other actions required to prevent the loss of service or function; and
- e. need for and means of providing auxiliary power, heat, water, sewage disposal and other services necessary for continued operation of vital facilities.

C9. Establish operational procedures for police, fire, utility repair, rescue, medical and other services prior to and during floods including:

- ** a. placement of equipment and personnel to prevent loss of access due to flooding of roads and underpasses or failure of bridges;
- b. means of relaying calls for assistance and coordinating responses; and
- ** c. alternate routes for entering areas where traffic is controlled and avoiding evacuation routes.

C10. Establish procedures for evacuation or protection of important records and documents located in areas subject to flooding including those relating to:

- ** a. vital statistics;
- ** b. tax and payroll information;
- ** c. court records;
- ** d. utility records;
- ** e. property ownership; and
- ** f. business records.

D. Recovery Element

Planning Objectives: To initiate and carry out post flood actions to maintain public health, return community services to normal at the earliest possible time and to provide aid and assistance in recovery.

Planning Tasks: Maintenance of Public Health
Return of Services
Rehabilitation and Repair
Mobilization of Assistance

Maintenance of Public Health Task

D1. Establish procedures for handling of the dead including:

- a. morgue location and method of operation;
- ** b. handling of personal effects; and
- ** c. identification and release of bodies.

D2. Establish procedures for actions to preserve public health including:

- a. provision of emergency medical services and care for injured persons;
- b. procedure for locating missing persons and providing information to friends and relations;
- c. collection and destruction of contaminated foodstuffs;
- d. disinfection of private water supply sources and systems;
- e. inoculations and other preventive medical care;
- f. disease control; and
- g. control of insects, rodents, and other pests.

Return of Services Task

D3. Establish procedures for actions to resume provision of utility services including:

- ** a. preparations to be made by property owners;
- b. system preparations including decontamination of water supplies;
- c. sequence for returning services; and
- ** d. priority for resuming services.

D4. Establish procedures for returning to normal traffic patterns including:

- a. evaluation of road and bridge safety;
- b. debris clearance; and
- ** c. priority for providing access.

Rehabilitation and Repair Task

D5. Establish procedures for post-flood clean-up including:

- a. clearance, collection and disposal of debris and discarded goods;
- ** b. street washing;
- c. pumping basements; and
- ** d. return of material previously relocated for safekeeping.

D6. Establish procedures for management of damaged structures including:

- a. procedures for identification and evaluation of damage;
- b. demolition or temporary repair of hazardous buildings.

Mobilization of Assistance Task

D7. Identify the sources and programs for recovery assistance and the means of obtaining each including:

- a. volunteer organizations;
- b. mutual aid agreements;
- c. state assistance; and
- ** d. federal assistance.

D8. Establish procedures for mobilizing assistance from each available source including:

- a. conditions under which requests for assistance will be made;
- ** b. channels to be followed in requesting assistance; and
- ** c. preparation of necessary requests, disaster declarations or other documentation required as a condition of assistance.

E. Public Information Element

Planning Objectives: To develop community awareness and understanding of the flood hazard and to prepare for the accurate and timely provision of information during flood emergencies.

Planning Tasks: Community Education
Emergency Information

Community Education Task

E1. Prepare the materials for and carry out a continuing public information program, including letters to residents in evacuation areas, to increase community awareness of floods and evacuation area residents' knowledge with respect to:

- ** a. the source, nature, frequency and potential severity of floods;
- b. the community's system for flood recognition and dissemination of warnings to the public;
- ** c. the meaning of various types of warning announcements, siren signals and/or evacuation notices;
- ** d. the areas likely to be inundated or evacuated at each level of expected flooding;
- e. procedures for evacuation including preparations for evacuation, routes, safe destinations and identification of reception centers;
- ** f. actions which can be taken by property owners to reduce damages including movement of furniture and valuables, curtailment of electrical power and gas service and temporary floodproofing;
- ** g. means of requesting identification as a special warning recipient or receiving special assistance in evacuation;
- ** h. safety and remedial actions to be taken when returning to flood damaged buildings.

E2. Prepare and carry out a continuing program to provide technical information to those wishing to employ temporary floodproofing measures or needing to develop more detailed subplans for warning dissemination, evacuation, and damage reduction including:

- ** a. identification of areas where the depth and velocity of expected flooding and opportunities for egress enable the use of temporary floodproofing measures;
- ** b. procedures for temporary floodproofing;
- ** c. relation between forecast flood heights and on-site depths; and
- ** d. guidelines and criteria for warning dissemination and evacuation plans for hotels, motels, hospitals and/or other facilities requiring more detailed arrangements.

Emergency Information Task

E3. Identify the types of emergency information to be conveyed to the public in the period prior to, during and immediately following a flood including:

- a. early watches, warnings and evacuation notices; worded appropriately to obtain maximum public response;
- b. information on actions to be taken, location of safe areas and areas to be avoided, location of reception centers, and ways of obtaining emergency assistance;
- c. actions being taken or to be taken to deal with the flood;
- d. calls for labor, equipment or other types of assistance needed for evacuation damage reduction and/or recovery activities; and
- e. information concerning sources and availability of recovery assistance.

E4. Identify the means and procedures to be used in communicating each type of information with respect to:

- ** a. form and content of each type of message;
- ** b. handling of flood warnings and other related messages;
- ** c. source and verification of messages; and
- d. interfacing of communications equipment.

E5. Prepare warning announcements for use in various potential circumstances and expected flood heights which:

- ** a. provide specific information and instructions;
- ** b. reference an authoritative and familiar source; and
- ** c. ensure an immediate adequate response on the part of the public and responsible officials to warning messages by considering the various factors governing warning confirmation and warning belief.

F. Plan Implementation Element

Planning Objectives: To develop the administrative arrangements necessary for effective implementation of the flood preparedness plan.

Planning Tasks: Resource Identification
Responsibility Allocation
Coordination

Resource Identification Task

F1. Identify type and amount of resources required for implementing the plan including:

- a. technical, administrative and other personnel;
- b. equipment and supplies; and
- c. facilities.

F2. Identify the sources of personnel, equipment, supplies and facilities for implementing the plan including:

- a. community resources;
- b. private resources;
- c. assistance through mutual aid agreements; and
- d. state and/or federal assistance.

Responsibility Allocation Task

F3. Evaluate each aspect of plan implementation with respect to:

- a. actions requiring detailed and specific assignments of responsibility; and
- b. actions suitable for assignment on an organizational basis.

F4. Assign responsibility for implementation of each aspect of the plan including:

- a. instructions as to how, when and by whom implementation is to be assured;
- b. requirements for any necessary subplans or supplemental procedures; and
- c. establishment of a chain of command to ensure plan implementation will proceed in the event of absence or incapacity of key personnel.

Coordination Task

F5. Establish procedures for coordination of local governmental actions through an emergency operations center, if available, or other mechanisms, including:

- a. identification of responsibilities to be assigned to the center;
- b. operational procedures for staffing, and operation of the center to carry out the assigned responsibilities; and
- c. procedures for activation and termination of the center.

F6. Establish necessary arrangements, including mutual aid agreements, for use of facilities, equipment and personnel, and services necessary for implementation of the plan including:

- ** a. location of river and rainfall gages, participation of observers, and receipt of information from upstream areas;
- ** b. land rights for flood fighting and other purposes;
- c. use of reception centers, hospitals, and areas for property storage;
- d. use of vehicles for evacuation or movement of property;
- e. participation of volunteer organizations; and
- f. provision of necessary supplies, materials, construction equipment and other items.

F7. Establish procedures to coordinate the local plan fully with state and other local plans for emergency operations including:

- a. integration with regional or statewide flood warning systems and communication networks, state flood disaster plans and other local natural disaster plans;
- ** b. coordination of evacuation plans with those for flood control, particularly where closure of floodgates in levees or floodwalls may affect escape routes; and
- ** c. coordination with NWS with respect to use of all available information and issuance of warnings.

F8. Establish procedures to guide and coordinate more detailed site-specific planning for warning dissemination, evacuation and damage reduction in public and private buildings including:

- ** a. process for identifying locations where such plans are necessary;
- ** b. minimum elements and appropriate level of detail to be included in planning; and
- ** c. provision of technical assistance in planning.

. Plan Maintenance Element

Planning Objectives: To update, extend and improve the flood preparedness plan and to insure readiness for executing the plan.

Planning Tasks: Plan Updating
Plan Improvement
Plan Practice

Plan Updating Task

G1. Establish procedures and schedules for plan contents subject to rapid obsolescence including:

- ** a. addresses, telephone numbers, and names of key participants;
- ** b. assignments of responsibility;
- ** c. changes in flood potential;
- ** d. areas requiring evacuation;
- ** e. availability of facilities for reception centers;
- ** f. evacuation routes and priorities;
- ** g. flood fighting requirements;
- ** h. utility extensions or system modifications; and
- ** i. traffic control requirements.

G2. Establish procedures for updating of plan contents based on specific events such as:

- ** a. construction of or modification in the operation of upstream water control structures which affect the height, severity, or time of flooding;
- ** b. natural or unplanned events which modify the flood potential; and
- ** c. construction or modification in the operation of facilities in or downstream of the community which increases the height, severity, or duration of floods.

Plan Improvement Task

G3. Describe needed and planned extensions of the warning system and preparedness plan including:

- ** a. coverage of additional area; and
- ** b. incorporation of elements, tasks and subtasks omitted from the initial plan.

G4. Describe needed and planned refinements to the warning system and preparedness plan including:

- ** a. provision of additional observers, gages and flash flood alarms to improve the flood recognition system;
- ** b. more detailed identification of areas to be evacuated;
- ** c. strengthening of communications involved in all aspects of the plan; and
- ** d. development of additional subplans for various affected organizations and locations.

G5. Establish procedures for the critical evaluation of performance in real and simulated implementation of the plan including:

- ** a. process for initiation, organization and conduct of the evaluation; and
- ** b. process for modification of the plan based on findings of the evaluation.

Plan Practice Task

G6. Establish procedures and schedules for testing those aspects of the flood warning system and preparedness plan which are susceptible to periodic use such as:

- ** a. procedures for communication with observer networks, NWS and other federal offices, special warning recipients, organizations and officials responsible for warning dissemination and plan execution, and others as may be appropriate;
- b. communications equipment including sirens, radio transmitters and receivers, flash flood alarm circuits, and others, with particular attention to battery powered equipment;
- ** c. auxiliary sources for electrical power and other services;
- ** d. procedures for activation of the emergency operation center, sending and receiving observer reports, handling messages, preparing forecasts, disseminating warnings, placement of equipment and personnel for evacuation and rescue, protection of vital facilities and other steps in execution of the plan.
- ** e. availability and operational status of equipment for evacuation, rescue and damage reduction activities; and
- ** f. availability and procedures for use of key maps, lists and other important plan documentation.

G7. Establish procedures and schedules for the periodic simulation of those aspects of the warning system and preparedness plan not susceptible to direct testing such as:

- ** a. decisions to issue warnings or direct evacuation;
- ** b. evacuation;
- ** c. implementation of traffic control procedures;
- ** d. activation of reception centers;
- ** e. curtailment of utility services; and
- ** f. procedures for rescue, handling of injuries and casualties, and public health measures.

RECOMMENDATIONS

RECOMMENDED MUNICIPAL CHANGES

The City of Milford is vulnerable to hurricanes, strong tidal action and flooding from its exposure to Long Island Sound, and general riverine flooding from several watercourses within the town. A large percentage of Milford's coastline is characterized by low-lying, highly developed residential areas, many of which lose access and become isolated during coastal storms. Approximately 2,300 residential, commercial and industrial structures have been identified as being located within flood zones; and 3,400 residents of Milford live in flood prone areas. It is the responsibility of local authorities to plan, prepare and provide for their constituents in the event of an emergency. Flood preparedness is furthermore most effectively practiced at the local level. The municipal officials are, therefore, encouraged to implement flood preparedness measures to protect the lives and property of floodplain inhabitants.

I. Emergency Operations Plan

Milford has experienced at least ten major coastal storms since 1938, costing millions of dollars in damages and the loss of at least one life. Steps have consequently been taken by the city to mitigate future damages, including the establishment of an approved Emergency Operations Plan and warning system, the establishment of an Emergency Operations Center to coordinate emergency services during a flood and integration with the National Weather Service broadcasting system for early warning.

While Milford has demonstrated strong initiative in dealing with coastal flood problems, we are recommending that the process be taken one step further by developing and appending to the city's Emergency Operations Plan or Natural Disaster Planning a written flood annex, specifically addressing flood warning, preparedness and mitigation efforts. Development of such an annex may be facilitated through the use of the attached guidelines (see Planning Guidance and Checklist for Evaluation of Existing Flood Preparedness Plans). These guidelines, developed in 1977 by the National Weather Service, are intended to assist a community in its initial development or improvement of existing flood preparedness plans. While the guidelines identify a range of matters to be considered, suggest procedures and provide a planning aid, they do not contain or constitute a model plan. Each community must first assess its potential flooding problem and identify the resources available for warning, evacuation and recovery procedures. Each town's needs will vary according to the frequency and severity of anticipated flooding, the size of the population affected and the advanced warning time available. The guidelines were used to assess the adequacy and identify deficiencies of Milford's existing Emergency Operations Plan and Natural Disaster Planning in addressing flood hazards.

A. Warning

Milford's Warning Annex (December 8, 1981) includes a number of the elements recommended in a flood preparedness plan, such as selection of a warning point and standard operating procedures for the warning point. Because of Milford's shoreline exposure, however, it is strongly recommended that observers be assigned to monitor rainfall

and rising water, prepare estimates of flood severity and issue reports to the Emergency Operations Center. Milford should additionally consider the implementation of an automated flood warning system in conjunction with the Northeast River Forecast Center of the National Weather Service. These measures could increase the time available to warn residents and businesses who would be affected by potential flooding.

Warning dissemination procedures are included in the annex, but special warning recipients and the methods used to warn them should be identified. Such recipients may include:

1. Persons or organizations involved in decisions to initiate general dissemination of warnings
2. Police, fire, rescue and other emergency forces
3. Public works department
4. Persons responsible for operating the Emergency Operations Center
5. Mutual aid
6. Utilities
7. Schools, convalescent homes, elderly housing
8. Hotels, motels
9. Businesses, facilities or homes requiring additional time to implement floodproofing techniques
10. Individuals who may not receive or comprehend warnings by techniques in general use such as the deaf
11. Marinas and water borne traffic

B. Evacuation

It is recommended that the evacuation planning as assigned to the Milford Civil Preparedness (Civil Defense) Agency and implemented by the Fire Department be more fully developed and integrated into a

flood annex. Evacuation poses particularly difficult problems in Milford, as a number of areas suffer loss of access in addition to inundation. Flood prone areas must first be identified in the annex; priorities for evacuations should then be established with particular emphasis on the heavily populated coastal flood zones including Milford Point, Walnut Beach, Great Creek, Bayview Beach, and Pond Point. Where possible, evacuation routes from these areas should be selected which are safe from flooding and easily identifiable to the public. Where possible, alternate evacuation routes should be planned where they exist in the event of a bridge or road washout. Evacuation planning should additionally include:

1. Description of traffic control arrangements to expedite evacuation and passage of emergency vehicles and prevent accidental travel into dangerous areas
2. Provisions for any necessary assistance to evacuees such as transportation and aid to invalids
3. Arrangements for security of evacuated areas; and
4. Listing of maps, tabular data or other aids required to support evacuation planning

It is important to note that the Milford Police and Fire Departments have gone on record as being opposed to any development in any floodplain area primarily because of the loss of access to such areas for emergency services.

C. Mobilization of Assistance

The local government is responsible for mobilizing local resources to support an effective disaster operation. The Emergency Operations Plan contains good provisions for contacting and enlisting the aid of mutual agreements and volunteer organizations for recovery assistance (towns of Stratford, West Haven and Orange, American Red

Cross, Salvation Army, Veterans organizations, womens' organizations and auxiliaries) and for coordinating their efforts. The sources and programs for state and federal assistance should also be identified in the Emergency Operations Plan.

All local requests for state and federal assistance are channeled through the Area II Coordinator to the State Office of Civil Preparedness. The State Office of Civil Preparedness then mobilizes assistance from the appropriate state agencies and, if necessary, federal assistance from the Federal Emergency Management Agency.

Although the primary responsibility for disaster relief lies with the State of Connecticut and the municipalities, a number of federal agencies offer supplemental relief and recovery programs. To expedite requests for such aid, the town may wish to document the primary federal assistance programs in the Emergency Operations Plan. These agencies and programs are outlined below:

1. Department of Agriculture/Soil Conservation Service

Emergency Watershed Protection to carry out emergency measure installation for soil erosion prevention and run-off retardation in watersheds that have been suddenly impaired by a natural disaster

2. Department of Commerce/National Oceanic and Atmospheric Administration - National Weather Service

Forecasts and Warnings to provide a forecast and warning service for all weather related to natural disasters

River and Flood Forecast and Warnings Services to provide forecasts of warning levels of the nation's rivers as a direct contribution to public safety

3. Department of Defense/U.S. Army Corps of Engineers

Flood Control Works and Federally Authorized Coastal Protection Works, Rehabilitation to assist in the repair and restoration of flood control works damaged by floods or federally authorized hurricane flood and shore protection works damaged by extraordinary wind, wave or water action

Flood Fighting and Rescue Operations to provide emergency assistance as required to supplement local efforts and capabilities in time of flood or coastal storm

Protection of Essential Highways, Highway Bridge Approaches and Public Works to provide bank protection of highways, highway bridges and essential public works endangered by flood-caused erosion

4. Federal Emergency Management Agency

Communications to provide temporary communication facilities in disaster areas where such facilities have been severely disrupted

Debris Removal to remove debris and wreckage resulting from a major disaster from publicly and privately owned lands and waters when determined to be in the public interest

Food, Water and Shelter to provide food, water, mass feeding and shelter services in time of natural disaster

Protection, Evacuation, Search and Rescue to protect life and property and to carry out evacuation and search and rescue operations

Public Transportation to provide temporary public transportation services to meet emergency needs when such services have been severely disrupted because of a major disaster

Temporary Housing to provide temporary housing for individuals and families displaced as a result of a disaster

Community Disaster Loans to provide funds to any local government which has suffered a substantial loss of tax and other revenue as a result of a major disaster and has demonstrated a need for financial assistance in order to perform its governmental functions

Repair or Reconstruction of Public Facilities to provide for the repair, restoration, reconstruction or replacement of public facilities which have been damaged or destroyed by a major disaster.

It is important that these agencies and programs be identified in the Emergency Operations Plan to ensure that the contacts needed for

assistance during and immediately following a disaster are readily available.

D. Community Education/Public Awareness

A public information element is needed in the Emergency Operations Plan to develop community awareness and understanding of the flood hazard and to provide accurate and timely information during flood emergencies. Community education serves to: (1) increase awareness of potential flood hazards, (2) familiarize the public with the town's system for flood recognition and dissemination of warnings to the public and how emergency operations will be conducted in the event of a disaster, (3) inform residents of the areas likely to be evacuated during a flood and provide information concerning evacuation routes and destinations, (4) inform residents of actions they can take before and immediately following a flood to reduce damages such as moving valuable possessions and turning off utilities, and (5) provide a means of requesting identification as a special warning recipient or receiving special assistance in evacuation.

The Natural Resources Center has conducted a limited public awareness campaign in Milford by disseminating a residential property owner's questionnaire concerning flood hazard awareness and flood preparedness measures to a representative sample of flood zone occupants. Additional information regarding flood preparedness planning, the National Flood Insurance Program and floodproofing techniques was distributed with the questionnaire. A large percentage of respondents requested yet more detailed information from the Natural Resources Center, indicating there exists a strong public demand for more flood preparedness information. Because we were

unable to contact all floodplain occupants, the Natural Resources Center constructed two flood preparedness exhibits that are available to municipalities upon request for public display. Ideally, all hazard awareness campaigns should be formulated and conducted at the local level so they can be made as specific and meaningful as possible. The City of Milford should additionally consider implementing a continuing program of community education by distributing newsletters, flyers or brochures townwide or holding public meetings that will reach all citizens and maintain public awareness of flood preparedness.

E. Plan Maintenance and Practice

Milford's Emergency Operations Plan contains provisions and schedules for updating but falls short of specifying the information that must be kept current. Most importantly, the names, addresses and telephone numbers of key participants and assignments of responsibility must be updated on an annual or semi-annual basis. Additional information regarding changes in flood potential, areas requiring evacuation, availability of facilities for reception centers, evacuation routes and priorities, flood-fighting requirements and adjustments made necessary by experience gained as a result of exercises should be updated as needed.

In addition, provisions should be included in the plan for testing the warning system and preparedness and response activities. Such exercises are invaluable in familiarizing the participants with the operation of the Emergency Operations Center and associated duties. Plan practice further functions in: (1) establishing lines of communication, (2) providing coordination between agencies and

departments, (3) setting priorities for use of manpower and equipment when resources are exhausted, and (4) surfacing unforeseen problems, allowing participants to analyze the situation and make recommendations for improvements, thereby lessening the confusion that accompanies a real disaster.

II. Flood Insurance

Milford is enrolled in the regular phase of the National Flood Insurance Program (NFIP), which enables all property owners within the town to purchase federally subsidized flood insurance. The inventory of structures located within flood zones in Milford identified 2,281 residential, commercial and industrial structures and utilities as flood prone. One thousand eight hundred seventy one (1,871) of those structures are located in the A zone (100-year flood zone) and V zone (100-year flood zone subject to wind and wave action). Comparing this figure (1,871) with the number of flood insurance policies in effect (988 as of March 31, 1982), it appears that forty-eight percent of the structures vulnerable to the 100-year flood hazard are not insured against flooding.

It is recommended that an attempt be made to increase the flood insurance coverage in Milford, given the high percentage of flood-prone structures that are not insured. Flood insurance is an effective tool in reducing the enormous recovery costs associated with a flood disaster incurred by both the public and private sectors. Furthermore, recent changes in federal legislation have placed greater responsibility for flood preparedness on the state and local

governments and the private sector. Federal disaster aid has been reduced from a 100 percent federal to a 75 percent federal/25 percent state and local share. Flood insurance premiums have increased substantially; standard deductibles have more than doubled. Replacement cost coverage is now available only on a single-family principal residence. Yet, the purchase of flood insurance is clearly the most cost beneficial step a property owner can take to reduce flood losses. As an incentive, however, policyholders are now eligible for reimbursement of expenses incurred in moving contents of a structure away from a pending flood. Such changes are aimed at reducing the existing flood hazard potential and forcing flood zone occupants to take responsibility for flood preparedness actions.

Flood insurance coverage could be increased most effectively through the efforts of independent insurance agents. Insurance agents are most knowledgeable about property insurance, and the incentive to promote flood insurance coverage is the commission earned on the policies written.

The municipality could assist with flood insurance promotion through a public awareness campaign or community education program for flood preparedness. In addition, property owners who are willing to risk reconstruction costs may consider purchasing flood insurance if the town reinforces the additional requirements placed on construction begun after the publication of the Flood Insurance Rate Map. For example, new construction or substantial improvements initiated after the effective date of the Flood Insurance Rate Map (September 29, 1978) are subject to more stringent building codes, as the lowest floor elevation of buildings in special flood hazard areas must be at or above the base flood elevation.

III. Floodplain Zoning and Floodplain Ordinances

Milford's Flood Plain Zoning Regulations provide excellent guidelines for the city's future floodplain management. By detailing mandatory floodproofing measures, construction specifications in flood zones, and standards for granting permits or variances, the regulations facilitate administrative and court review and provide certainty and predictability in the review process. Effectiveness of the program will depend on stringent enforcement of the regulations.

The only recommendation made concerns critical uses in flood zones. While judicious use of the 100-year flood standard as a minimum for flood hazard area regulation should be continued, critical facilities should be protected to the 500-year elevation. Critical facilities include disaster, fire and police centers, hospitals, prisons, facilities for the elderly and handicapped, fuel and hazardous or toxic materials storage. These facilities pose unique, serious threats to public health and safety when exposed to flooding, and the town may wish to consider banning such uses from the floodway and flood fringe areas.

IV. Land Acquisition

Land acquisition is an effective but infrequently used approach to reducing future flood damages. Section 1362 of the National Flood Insurance Act of 1968, as amended, specifically provides for the acquisition, in limited circumstances, of flood damaged properties and

conversion of the properties to a public open space or recreational use. In 1981, the Coastal Area Management Unit of the Department of Environmental Protection undertook a study to identify specific locations along the Connecticut coast where this technique had high potential for application following a major flood. The result of this effort, the Connecticut Coastal Flood Hazard Area Study, identified one such area in Milford: Cedar Beach.

The City of Milford is encouraged to give serious consideration to acquiring properties within Cedar Beach as part of its overall coastal management and floodplain management programs. In addition, the recommendations put forth in the study to increase the chances of receiving Section 1362 funds should be followed, namely:

- a. modify existing floodplain management regulations so that they go beyond the minimum FEMA regulations.
- b. maintain a record of strict enforcement of floodplain regulations, with few or no variances permitted
- c. prepare a post-flood recovery and hazard mitigation plan
- d. develop an effective flood warning and evacuation plan
- e. submit a complete and timely annual report to FEMA
- f. establish a procedure to notify all prospective purchasers and renters of flood-prone properties of the risk of living in the area.

V. Road, Bridge and Culvert Design Standards

The State of Connecticut supports the policy of whenever possible, upgrading hydraulically inadequate stream crossings to provide adequate capability to pass the 100 year flood discharge. Following the June 1982 flood, however, it was discovered that most

municipalities had inadequate stream crossing standards to qualify for upgrading under FEMA's public assistance program. Replacement of local stream crossings destroyed during a declared disaster are funded by the Federal Emergency Management Agency's public assistance program. This program provides for all publicly owned structures to be replaced to the pre-flood condition with a maximum of fifteen percent of the Damage Survey Report total available for disaster proofing. If more stringent standards are formally adopted, enforced and in general use by the applicant at the time of the disaster, the structure would be upgraded, and a larger percentage paid by FEMA funds. Milford is therefore encouraged to adopt municipal road, bridge and culvert design standards equivalent to those in effect at the state level. Such standards would eliminate repeated road and bridge damage at the local level, reduce long-term damages and result in higher federal reimbursements.

VI. Stormwater Management

Stormwater run-off is a valuable natural resource that augments water supply, recreation and groundwater recharge. Excessive stormwater run-off, however, can result in flooding, property damage and the destruction of roads and utilities. The entire City of Milford is subject to surface water run-off. It is recommended that Milford consider the development of a local comprehensive stormwater management plan to guide and coordinate the future development of the city's watersheds.

An effective stormwater management plan would provide a balanced and flexible run-off control program by coordinating improvements to the existing drainage facilities and planning facilities for future use on a watershed basis. Development proposals are generally reviewed individually for their effect on flow rates. With a comprehensive plan, however, future development of each watershed would be examined with respect to the cumulative increases in peak run-off rates throughout the watershed. A stormwater run-off management solution for each development proposal would be based on, and supportive of, the plan for the entire basin. A stormwater management plan would thereby serve to reduce the impact of urbanization on the riverine system, including flooding, channel instability and potential erosion or siltation problems, and preserve the natural qualities of the watershed for aesthetic, recreational, fisheries and wildlife purposes.

VII. Conclusions

A. Milford has developed good floodplain management measures in the following areas:

1. Warning, Damage Assessment and Natural Disaster Annexes of the Emergency Operations Plan
2. Floodplain Zoning Regulations

B. Milford could improve its flood management programs in the following areas:

1. Development of a "flood annex" to the city's Emergency Operations Plan or Natural Disaster Plan, specifically addressing flood warning, flood preparedness and flood mitigation efforts and development of an automated flood

warning system.

2. Development and implementation, on a continuing basis, of a community education/public awareness program for residents of Milford's flood zones.
3. Increase the flood insurance coverage among owners of residential, commercial and industrial property located in flood zones.
4. Maintaining stringent enforcement of floodplain zoning regulations.
5. Adoption of municipal road, bridge and culvert design standards to the 100 year flood standard.
6. Development of a comprehensive stormwater management plan.

